J. K. WHITTIER.

CONDENSER LAP MACHINE.

APPLICATION FILED AUG. 19, 1908.

1,034,850. Patented Aug. 6, 1912.

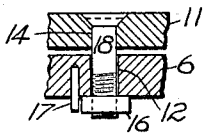

Fig. 9

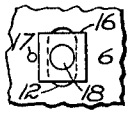

Fig. 10

Fig. 1

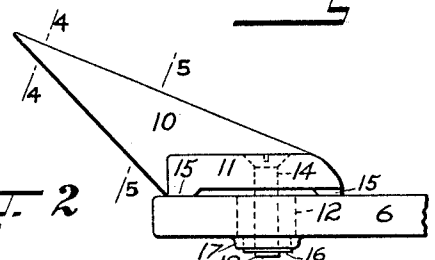

Fig. 2

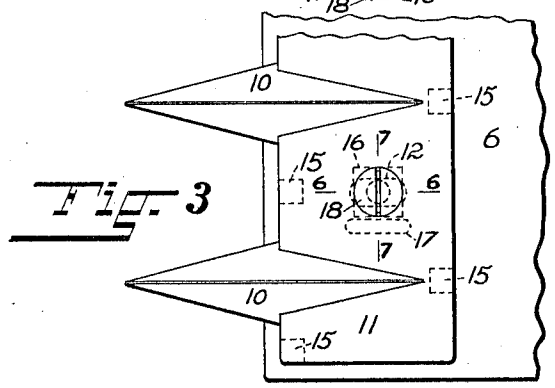

Fig. 3

Fig. 4

Fig. 5

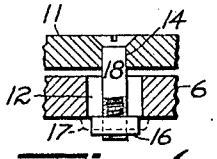

Fig. 6

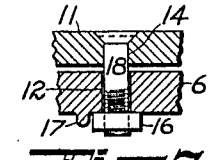

Fig. 7

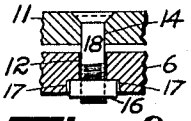

Fig. 8

WITNESSES

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CONDENSER-LAP MACHINE.

1,034,850. Specification of Letters Patent. **Patented Aug. 6, 1912.**

Application filed August 19, 1908. Serial No. 449,352.

To all whom it may concern:

Be it known that I, JOHN KILBY WHITTIER, of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Condenser-Lap Machines, of which the following description, with the accompanying drawings, is a specification.

Like letters on the drawings denote like parts.

This invention is an improvement in condenser-lap machines and particularly in means for preventing the splitting of laps as they unroll upon the aprons of succeeding machines, such as other condenser-lap machines and carding-engines.

It relates to improvements in means for advancing-and-compacting the fibrous material in combination with fiber-rearranging means whereby certain fibers are intermixed and interwoven with other fibers before the lap is rolled and the splitting of the lap thereafter prevented. Its objects are: first, to provide a more efficient form for the forward-terminal portion of the fiber-rearranging means; second, to arrange the said portion and, especially, its fiber-rearranging elements in more efficient relation to the fiber advancing-and-compacting surfaces with which they co-act; third, to improve the means for the attachment of the fiber-rearranging means, and, fourth, to provide attachments for condenser-lap machines such as can be manufactured and sold independently of the said machines and applied thereto in a mill that is far from any well-equipped machine shop and which comprise fiber-rearranging means. These objects are attained by the mechanism that is illustrated in the accompanying drawing, in which:

Figure 1 is a diagrammatic representation of a portion of a condenser-lap machine. Fig. 2 is an elevation of a detail. Fig. 3 represents a plan thereof; Fig. 4 represents a cross-section taken at line 4—4 of Fig. 2; Fig. 5 represents a cross-section taken at line 5—5 of Fig. 2; Fig. 6 represents a vertical-section taken at line 6—6 of Fig. 3; Fig. 7 represents a vertical-section taken at line 7—7 of Fig. 3; Fig. 8 represents a vertical-section of a modification corresponding to Fig. 7; Fig. 9 represents a vertical-section of a different modification corresponding to Fig. 7; and, Fig. 10 represents a reversed-plan of the modification that is represented in Fig. 9.

In Fig. 1, 1 represents the forward end of a "trough-bottom" that is more specifically called a "screen" or a "grid." It is the bottom of the "trough" or "trunk," through which the lap-forming-materials pass to the "condenser-cages" 2 2. The "trunk-cover" is represented by 3. The arrow in the trunk indicates the general direction of the motion of such materials. The typical shape of the surface of the previously deposited mass of such materials is represented in cross-section, by the line 4 4 4, although the actual shape of such cross-section varies considerably from time to time. Within the trunk and approaching the surface represented by 4 4 4 are shown flying tufts or fragments of such materials. Ordinarily, the parts of such tufts adhere together better than such whole tufts or fragments adhere to one another. As such materials pass the draw-rolls 5 5 over the draw-plate 6 they are called a "sheet." The sheet is compacted by the calender-rolls 7 7 7 7, and finally is wound by the winding-drums 8 8 into a lap 9.

The surface represented by 4 4 4 is one of comparatively easy splitting. In the sheet, it becomes substantially V-shaped with its angle in advance and near the center of the sheet and with its other extremities in the surfaces of the sheet. In the rolled lap, the outer surface splits more easily than the inner one. Laps that contain much waste composed of tufts of straight parallel fibers, split very easily between or through such tufts and easily fall apart. By my invention, I disarrange such parallelism and confusedly intermix and interweave fibers of different tufts by dragging forward some fibers or parts of fibers and detaining others or parts of others. I prefer that such rearrangement of the fibers shall occur throughout the thickness of the lap, that it shall be most effective in a series of narrow and parallel strips of the sheet, and, especially so, in the outside surface of the rolled lap. I make this rearrangement more permanent by severely compacting the materials immediately after the rearrangement and before the stresses that have been produced during the rearrangement within the elastic mass of the materials have had opportunity to return the rearranged fibers

to their original positions to any important extent.

In my improvements I utilize any usual co-acting fiber-advancing-and-compacting surfaces preferably the surfaces of the upper pair of calender-rolls. I particularly utilize the parts of such surfaces where they bite the materials and another part of the surface of one of them, preferably the lower surface of the upper calender-roll. Preferably, I oppose to the said lower surface a series of stationary teeth or projections situated but a short distance apart in a line parallel to the axes of the calender-rolls and extending entirely across the machine. If the fibers that lie between the advancing lower surface of the upper calender-roll and the stationary point of each tooth of such a series are compressed with force that is intense enough, then the fibers will be rearranged sufficiently to prevent the splitting of the lap. The narrower the back and the sharper the point of each tooth the less the total pressure of a tooth opposed to that of the calender-roll which is necessary to compress the lap with an intensity that will rearrange the fibers sufficiently to prevent splitting. I prefer to use strong and inflexible cast teeth of pyramidal shape and triangular cross-section with plane sides and with very narrow straight backs formed by the intersection of the plane sides, the directions of the said backs intersecting the lower surface of the upper calender-roll at a large acute angle therewith, the said teeth having end-faces that intersect the said sides in sharp fiber-detaining edges, and having sharp, fiber-detaining points or apexes that are located in the direction and at the forward ends of such backs in close proximity to the lower surface of the upper calender-roll, and near to the fibers that are held in the bite of the rolls. As the advancing fibers, under the most severe compression that they receive, pass the fiber-engaging apex and edges, the elasticity of the fibrous material causes it to expand into the vacant space in front of the end of the tooth and bends the fibers forcibly through a large angle right at those edges and especially at the apex. Such bending greatly increases the fiber-retarding influence of the tooth. Almost immediately the fibers pass from these edges into the bite of the calender-rolls where they are severely compressed. Such compression tends to bend the fibers and to prevent those that have been rearranged from returning to their original position in the sheet, a result which the elastic nature of the sheet and the stresses produced therein by the rearranging would otherwise accomplish to a considerable extent. The prevention of the partial undoing of the rearrangement is more successfully accomplished than would have been the case had the rearrangement been performed at a greater distance from the bite of the calender-rolls. As the ordinary sheet approaches the lap-splitting-preventer its thickness approximates to a couple of inches. When it is under the most severe compression in such preventer its thickness is reduced to a very small fraction of an inch. The force of the greatest compression is severe and the tooth would tear through or partially through the sheet if its forward-end was located too far back from the bite of the calender-rolls. When the preferred form of tooth is located substantially as has been hereinbefore directed with its point in close proximity to the lower surface of the upper roll and near to the bite of the calender-rolls it cannot tear through the sheet but only rearrange some of the fibers.

Some deviation from the above stated general direction of the back of the preferred tooth and from the location of the point of the tooth, both with respect to the location of the calender-rolls, and some deviations from the shape of the tooth can be had without departing from my invention but I prefer about the shape, direction, and location stated.

In Figs. 1, 2, and 3 there is represented a plurality of teeth which are cast integral with and which project from a plate or support 11. This plate is represented as fastened, secured, or attached to a part 6 of a condenser-lap machine. This part 6 may be, preferably, a trough-bottom and especially, I prefer, that it shall be a draw-plate, but it may be a projection from the frame or it may be any part of a condenser-lap machine. When the teeth are proportioned as in Figs. 1, 2, and 3, I prefer to cast the teeth and the support 11 with which they are integral of good tough bronze, as the end of a tooth, if it be of bronze, is not likely to be broken off and carried by the sheet between the heavy calender-rolls to the great injury of such rolls. Because of the costliness of bronze, I prefer to make the support 11 narrow, as it is represented to be in the drawing, rather than to make it as large and heavy as an entire draw-plate. When the parts of the machine are being assembled for the first time, and afterward when the teeth have become worn, it is desirable to be able to universally adjust the line of the points of the teeth with respect to the bite of the calender-rolls and with respect to the lower surface of the upper calender-roll and also to give the direction of the back of a tooth an angle of about 67° with the said lower surface at its intersection therewith and an angle of about 35° with the tangent to those rolls at their bite I prefer to cast the teeth integral with the support as, in that case, no fastenings, projections, slits, or

other fiber-detaining devices near or between the bases of the teeth interfere with the free advance of the fibers relative to the teeth, and the line of the points or apexes of the teeth can be adjusted as a whole relatively to the parts with which the teeth cooperate. Such bronze teeth, integral with a support and thus adjustable with respect to the part 6 of a condenser-lap machine to which their support is designed and adapted to be fastened, constitute an attachment which can be manufactured and sold independently of the machine to which they may be applied. Such attachments can be shipped to any manufactory and old condenser-lap machines will be greatly increased in efficiency by their incorporation therein.

I prefer to apply my hereinbefore described invention for preventing the splitting of laps to every breaker, intermediate, and finisher lapper. If the lap splits when unrolling in an intermediate or a finisher lapper or in a carding-engine, the split-off portion adheres to the outer surface of the next inner coil of the lap. The operative must, as soon as possible and as far as he can, rectify this defect in the unwinding. Otherwise, the splitting and the adhesion may continue, while the splitting lap makes several rotations about its own axis. The split may tear through the sheet. It may tear across the width of the sheet. By my invention the operative is relieved from the necessity of closely watching the unrolling laps, from the work of rectifying as far as he can the defects due to splitting, and from throwing parts of the split laps into the waste to be worked over, and the waste is prevented. In other words, the cost of production is diminished by the use of my invention. The transference of a split-off portion of the lap from the part of the sheet where it belongs to a different part of the sheet tends to non-uniformity in the weight per unit of length of the product from the machine. In the usual intermediate and in the usual finisher lapper an evener is provided and the evener tends to correct such non-uniformity, but it will not perfectly correct it. In the usual carding-engine there is no evener mechanism and the resulting non-uniformity of the product is more serious. When my invention is used the laps do not split and non-uniformity consequent upon lap-splitting does not occur.

As a convenient means for adjustably fastening or securing the attachment to the condenser-lap machine, I have provided slotted holes such as 12 in the part 6, preferably in the draw-plate, and bolts such as 18 having nuts 16 the said bolts passing through holes 14 in the plate or support 11 and through the holes 12 in the part 6. By making the slotted holes 12 slightly wider than the diameters of the bolts 18 the general direction of the line of the forward-terminals or points of the teeth can be made parallel to the center lines of the calender-rolls or other means for compacting and carrying-forward the lap-forming-materials. By giving to the greater length of the slots in the part 6 the direction of the general forward movement of the lap-forming-materials those points can be set at the right distance from the bite of such means and by filing or machining the spots or feet 15 on the under side of the plate or support 11 the points of the teeth can be elevated or lowered with respect to the upper member of such means.

In the preferred form of adjusting-means, the positions in which the nuts of the adjusting-and-fastening-bolts 18 are preferably located are comparatively inaccessible. It is convenient to have the heads of such bolts at the top, as is shown in Figs. 2, 3, 6, 7, 8, and 9 and to have means for preventing the rotation of the nut secured to the machine. A vertical, cast, projection 17 on a level with the nut and near thereto is shown in Figs. 2, 3, 6, and 7 as such means. In Fig. 8 the nut is represented as let into a hole in the part 6, the hole having vertical sides 17 near to the edge of the nut as such means. In Figs. 9 and 10 a pin 17 is inserted fast in a hole in the part 6 near to the edge of the nut as a means preferred when the attachment is adjustably secured to a draw-plate or to a screen, in which cases the nut is accessible with difficulty.

I do not confine myself to the means for adjustment herein shown and described. I consider that any adjustment in the direction of the line of the points of the teeth that is more extended than that which is herein shown and described is practically unnecessary, but that it would be within my invention, if the teeth are integral with their support.

I claim:

1. In a condenser-lap machine, the combination with a pair of calender-rolls, a draw-plate located near to the said rolls, a support adjustably secured to the said plate, and fiber-rearranging teeth, integral with the support, located in the path of the advancing fibers, and having forward-terminal portions which are straight and upwardly-and-forwardly inclined, of fastening appliances for adjustably securing the said support to the said draw-plate with the fiber-rearranging portions of the teeth in the desired positions of adjustment relatively to the said rolls.

2. In a condenser-lap machine, the combination with a pair of calender-rolls; a draw-plate located near to the said rolls; a support adjustably secured to the said plate;

and, a plurality of fiber-rearranging teeth integral with the said support, located in the path of the fibers, each tooth being bounded by three plane surfaces meeting in a point located near to the bite of the calender rolls, two of the said surfaces uniting to form a back directed toward the lower surface of the upper calender-roll at a large angle therewith; of fastening appliances for adjustably securing the said support to the said draw-plate with the fiber-rearranging portions of the teeth in the desired positions of adjustment relatively to the said rolls.

3. In a condenser-lap machine, the combination with: a pair of calender-rolls; and, a draw-plate located near to the said rolls; of a support fastened to the said draw-plate and having a plurality of fiber-rearranging teeth integral therewith and located in the path of the advancing fibers, each such tooth having a forward-terminal portion having plane sides and a straight narrow back, the said sides ending abruptly in sharp fiber-rearranging edges at their intersection with the end face of the tooth near to the bite of the calender-rolls, and the said tooth having a sharp fiber-rearranging apex in the direction and at the forward end of the said back and in close proximity to the lower surface of the upper calender-roll, the direction of the said back making an angle of about 67° with such surface at its intersection therewith and an angle of about 35° with the tangent to the said rolls at their bite.

4. In a condenser-lap machine, the combination with: a pair of calender-rolls; a draw-plate located near to the said rolls; and, a support fastened to the said draw-plate and having a plurality of fiber-rearranging teeth integral therewith and located in the path of the advancing fibers, each such tooth having a forward-terminal portion having plane sides and a straight narrow back, the said sides ending abruptly in sharp fiber-rearranging edges at their intersection with the end face of the tooth near to the bite of the calender-rolls, and the said tooth having a sharp fiber-rearranging apex in the direction and at the forward end of the said back and in close proximity to the lower surface of the upper calender-roll, the direction of the said back making an angle of about 67° with such surface at its intersection therewith and an angle of about 35° with the tangent to the said rolls at their bite; of fastening appliances for adjustably securing the said support to the said draw-plate with the fiber-rearranging edges and apexes of the teeth in the desired positions of adjustment relatively to the said rolls.

In testimony whereof, I affix my signature in the presence of two witnesses.

JOHN KILBY WHITTIER.

Witnesses:

IRVING D. KIMBALL,

CHANNING WHITAKER.